

Third Semester B.E. Degree Examination, June / July 08
Electrical Measurements

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions choosing at least TWO questions from each part.

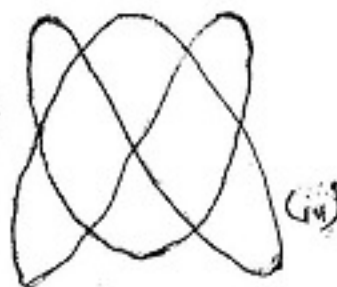
PART - A

1.
 - a. Derive the dimensions of Resistance, Inductance and Capacitance in L, M, T and I system of units. (04 Marks)
 - b. What are the advantages of S.I over other system of units? (04 Marks)
 - c. Define the bridge sensitivity (S_B), of a Wheatstone bridge and hence obtain an expression for the same in terms of voltage sensitivity. What will be the maximum value of S_B ? (08 Marks)
 - d. Explain the Kelvin's Double bridge and obtain the balance condition. (04 Marks)
2.
 - a. With the help of neat diagram, explain the working of Megger used for the measurement of Earth Resistance. (10 Marks)
 - b. Derive the equation of balance for Anderson Bridge. Also draw the phasor diagram. (10 Marks)
3.
 - a. Design a multirange d.c. milliammeter with a basic meter having a resistance of 75Ω and full scale deflection for a current of 2 mA. The required ranges are 0-10 mA, 0-50 mA, 0-100mA. (06 Marks)
 - b. What are the advantages of Instrument Transformers? (04 Marks)
 - c. Define the following terms with reference to a Potential Transformer.
 i) Transformation Ratio ii) Nominal Ratio iii) Turns Ratio iv) Ratio Correction factor. (04 Marks)
 - d. A 1000/5 A, 50 Hz current transformer has a bar primary and a rated secondary burden of 15VA. The secondary winding has 195 turns and a leakage reactance of 0.96 mH. The load burden is purely resistive. At rated load the magnetization m. m.f is 20A and core excitation is 12A. Find the ratio and phase angle error. (06 Marks)
4.
 - a. With the help of a neat diagram, explain the construction and working of a 1 - ϕ induction type energy meter. Discuss the adjustments to minimize the errors. (10 Marks)
 - b. A Wattmeter has a current coil of resistance 0.2Ω and a pressure coil of resistance 5000Ω . It is connected to measure the power consumed by a load. Calculate the percentage error in the reading of wattmeter, when the load takes 20A, at 250V, with 0.8 pf and when i) The pressure coil is connected on the supply side; ii) The current coil is connected on the supply side. (06 Marks)
 - c. Explain the block diagram of an electronic energy meter. (04 Marks)

PART - B

- a. Explain how frequency can be measured using a Weston frequency meter. (06 Marks)
- b. What is a rotating type phase sequence indicator and how it is used? (04 Marks)
- c. A digital voltmeter is used on a $4\frac{1}{2}$ digit display. Find its resolution. How would 11.87V be displayed on a 10V range? Also how would 0.5573 be shown on a 1V and 10V ranges. (05 Marks)
- d. With the block diagram, explain the principle of True R.M.S voltmeter. (05 Marks)

- 6 a. Explain the panel details of a Dual Trace Oscilloscope. (08 Marks)
 b. How can frequency, amplitude and phase angle be measured from Lissajous pattern on the oscilloscope. (06 Marks)
 c. Calculate the ratio of vertical to horizontal frequency for an oscilloscope, which displays the following patterns on the screen. Also find the unknown frequency if a known frequency of 150Hz is applied to x - plate. (06 Marks)



- 7 a. Differentiate between a sensor and a transducer. What are the factors affecting the choice of Transducers? (07 Marks)
 b. Explain the principle and working of LVDT. (07 Marks)
 c. Derive the expression for gauge factor for a strain gauge. (06 Marks)
- 8 a. Explain the working and applications of an X - Y recorder. (07 Marks)
 b. Write short note on the various display devices Viz. LED, LCD, Nixie tube. (07 Marks)
 c. Explain the components of a Digital Data Acquisition system. (06 Marks)
